Notice of Allowability	Application No.	Applicant(s)	
	10/675,240	MALTSEV ET AL.	
	Examiner	Art Unit	
	Leon Flores	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *7/20/2007*.

2. ☒ The allowed claim(s) is/are *1,2,4-16,18-23 and 25-29*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

David Payne
DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Gregory J. Gorrie (Reg. No. 36,530) on 9/11/2007.

In the claims:

Claim 1, lines 11-16, 'wherein the autocorrelation elements perform autocorrelations on differently delayed versions of the same serial symbol stream, and wherein the first and second durations are differing integer multiples of symbol durations, and wherein the first and second moving averages are different and based on the first and second durations, respectively' **has been changed to** ---wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein the first moving average element performs the first moving average over approximately one and a half durations, and the second moving average element performs the second moving average over approximately one-half durations on the second correlation output---.

Claim 3 has been cancelled.

Claim 14, lines 7-9, 'wherein the first and second phase shift estimates are generated by performing autocorrelations on differently delayed versions of the same serial symbol

stream, and wherein the first and second durations are differing integer multiples of symbol durations' **has been changed to** ---wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein integrating the first correlation output includes integrating the first correlation output over approximately one and a half durations, and wherein integrating the second correlation output includes integrating the second correlation output over approximately one-half durations---.

Claim 15, lines 1-11, 'The method of claim 14 wherein generating comprises: autocorrelating the serial symbol stream of training symbols with the symbol stream delayed by approximately the first duration to produce a first correlation output; autocorrelating the serial symbol stream with the symbol stream delayed by the second duration to produce a second correlation output; integrating the first correlation output to generate the first phase shift estimate; integrating the second correlation output to generate the second phase shift estimate; and combining the first and second phase shift estimates to generate the frequency offset estimate, wherein the integrating of the first and second correlation outputs are performed over different symbol durations based respectively on the first and second durations' **has been changed to** ---The method of claim 14 wherein generating comprises: autocorrelating the serial symbol stream of training symbols with the symbol stream delayed by approximately the first duration to produce a first correlation output; autocorrelating the serial symbol stream with the symbol stream delayed by the second duration to produce a second correlation output; integrating the first correlation output to generate the first phase shift estimate;

integrating the second correlation output to generate the second phase shift estimate; and combining the first and second phase shift estimates to generate the frequency offset estimate---.

Claim 17 has been cancelled.

Claim 22, lines 19-24, 'wherein the autocorrelation elements perform autocorrelations on differently delayed versions of the same serial symbol stream, and wherein the first and second durations are differing integer multiples of symbol durations, and wherein the first and second moving averages are different and based on the first and second durations, respectively' **has been changed to** ---wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein the first moving average element performs the first moving average over approximately one and a half durations, and the second moving average element performs the second moving average over approximately one-half durations on the second correlation output---.

Claim 24 has been cancelled.

Claim 27, lines 11-16, 'wherein the autocorrelations are performed on differently delayed versions of the same serial symbol stream, wherein the first and second durations are differing integer multiples of symbol durations, and wherein integrating of the first and second correlation outputs are performed for different durations based on the first and second durations, respectively' **has been changed to** ---wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein integrating the first correlation output includes integrating

the first correlation output over approximately one and a half durations, and wherein integrating the second correlation output includes integrating the second correlation output over approximately one-half durations---.

Allowable Subject Matter

2. Claims 1-29 are allowed.

3. The following is an examiner's statement of reasons for allowance: The art of record does not suggest the respective claim combinations together and nor would the respective claim combinations be obvious with:

Re claim 1, the further limitation of, *"a parallel-channel two channel frequency-offset estimator to generate a frequency offset estimate comprising: a first autocorrelation element to perform a first autocorrelation on a serial symbol stream of training symbols delayed by a first duration to produce a first correlation output; a second autocorrelation element to perform a second autocorrelation on the serial symbol stream delayed by a second duration to produce a second correlation output; a first moving average element to perform a first moving average on the first correlation output for use in generating a first phase shift estimate; and a second moving average element to perform a second moving average on the second correlation output for use in generating a second phase shift estimate, wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein the first moving average element performs the first moving average over approximately one and a half durations, and the second moving average element*

performs the second moving average over approximately one-half durations on the second correlation output". Claims 2, 4, 6-13 depend on claim 1 above.

Re claim 5, the further limitation of, "*a two-channel frequency-offset estimator to generate a frequency offset estimate comprising: a first autocorrelation element to perform a first autocorrelation on a serial symbol stream of training symbols delayed by a first duration to produce a first correlation output; a second autocorrelation element to perform a second autocorrelation on the serial symbol stream delayed by a second duration to produce a second correlation output; a first moving average element to perform a first moving average on the first correlation output for use in generating a first phase shift estimate; a second moving average element to perform a second moving average on the second correlation output for use in generating a second phase shift estimate; and a summator to combine the first and second phase shift estimates to generate a frequency offset estimate, wherein the summator multiples the first phase shift estimate by wl/2~T to generate a first weighted frequency estimate, and multiples the second phase shift estimate by w2/4~T to generate a second weighted frequency estimate, and combines the first and second weighted frequency estimates to generate the frequency offset estimate, wherein wl and w2 are weights and T is the duration".*

Re claim 14, the further limitation of, *"a method for frequency synchronization of an orthogonal frequency division multiplexed (OFDM) signal comprising: generating a frequency offset estimate using first and second phase shift estimates, the first phase shift estimate generated from a serial symbol stream of training symbols with the symbol stream delayed by approximately a first duration, the second phase shift*

estimate generated from the serial symbol stream with the symbol stream delayed by a second duration, wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein integrating the first correlation output includes integrating the first correlation output over approximately one and a half durations, and wherein integrating the second correlation output includes integrating the second correlation output over approximately one-half durations".

Claims 15-16,18 and 20-21 depend on claim 14 above.

Re claim 19, the further limitation of, *"a method for frequency synchronization of an orthogonal frequency division multiplexed (OFDM) signal comprising: generating a frequency offset estimate using first and second phase shift estimates, the first phase shift estimate generated from a serial symbol stream of training symbols with the symbol stream delayed by approximately a first duration, the second phase shift estimate generated from the serial symbol stream with the symbol stream delayed by a second duration, wherein generating comprises: autocorrelating the serial symbol stream of training symbols with the symbol stream delayed by approximately the first duration to produce a first correlation output; autocorrelating the serial symbol stream with the symbol stream delayed by the second duration to produce a second correlation output; integrating the first correlation output to generate the first phase shift estimate; integrating the second correlation output to generate the second phase shift estimate; and combining the first and second phase shift estimates to generate the frequency offset estimate, and wherein combining includes multiplying the first phase shift estimate by wl/2nT to generate a first weighted frequency estimate; multiplying the*

second phase shift estimate by w2/4nT to generate a second weighted frequency estimate; and summing the first and second weighted frequency estimate to generate the frequency offset estimate, wherein wl and w2 are weights and T is the duration".

Re claim 22, the further limitation of, *"an orthogonal frequency division multiplexed (OFDM) receiver system comprising: a dipole antenna to receive signals that include an OFDM packet; an RF receive unit to convert the OFDM packet to a stream of symbols; a data symbol processing unit to perform a Fast Fourier Transform (FFT) on the stream of symbols to generate a decoded bit stream; and a parallel-channel two channel frequency offset estimator to generate a frequency offset estimate using training symbols of the stream of symbols to rotate a phase of data symbols of the OFDM packet prior to performing the FFT, wherein the parallel-channel frequency-offset estimator comprises: a first autocorrelation element to perform a first autocorrelation on a serial symbol stream of training symbols delayed by a first duration to produce a first correlation output; a second autocorrelation element to perform a second autocorrelation on the serial symbol stream delayed by a second duration to produce a second correlation output; a first moving average element to perform a first moving average on the first correlation output for use in generating a first phase shift estimate; and a second moving average element to perform a second moving average on the second correlation output for use in generating a second phase shift estimate, wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein the first moving average element performs the first moving average over approximately one and a half durations, and the second moving*

average element performs the second moving average over approximately one-half durations on the second correlation output". Claims 23-25 depend on claim 22 above.

Re claim 26, the further limitation of, *"an orthogonal frequency division multiplexed (OFDM) receiver system comprising: a dipole antenna to receive signals that include an OFDM packet; an RF receive unit to convert the OFDM packet to a stream of symbols; a data symbol processing unit to perform a Fast Fourier Transform (FFT) on the stream of symbols to generate a decoded bit stream; and a two-channel frequency offset estimator to generate a frequency offset estimate using training symbols of the stream of symbols to rotate a phase of data symbols of the OFDM packet prior to performing the FFT, wherein the data symbol processing unit includes a phase rotator responsive to the frequency offset estimate, and wherein the two-channel frequency offset estimator includes: a first autocorrelation element to perform a first autocorrelation on a symbol stream of training symbols delayed by a first duration to produce a first correlation output; a second autocorrelation element to perform a second autocorrelation on the symbol stream of training symbols delayed by a second duration to produce a second correlation output; a first moving average element to perform a first moving average on the first correlation output for use in generating a first phase shift estimate; a second moving average element to perform a second moving average on the second correlation output for use in generating a second phase shift estimate; and a summator to combine the first and second phase shift estimates to generate the frequency offset estimate, and wherein the summator multiples the first phase shift estimate by wl/2nT to generate a first weighted frequency estimate, and multiples the*

second phase shift estimate by w2/4nT to generate a second weighted frequency estimate, and combines the first and second weighted frequency estimates to generate the frequency offset estimate, wherein wl and w2 are weights and T is the duration".

Re claim 27, the further limitation of, *"an article comprising a storage medium having stored thereon instructions, that when executed by a computing platform, result in: autocorrelating a serial symbol stream of training symbols with the symbol stream delayed by approximately a first duration to produce a first correlation output; autocorrelating the serial symbol stream with the symbol stream delayed by a second duration to produce a second correlation output; integrating the first correlation output to generate a first phase shift estimate; integrating the second correlation output to generate a second phase shift estimate; and combining the first and second phase shift estimates to generate a frequency offset estimate, wherein the first duration is a duration of one of the training symbols, and the second duration is twice the first duration, and wherein integrating the first correlation output includes integrating the first correlation output over approximately one and a half durations, and wherein integrating the second correlation output includes integrating the second correlation output over approximately one-half durations".* Claims 28-29 depend on claim 27 above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David Payne

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September 12, 2007